

Navy Energy Program

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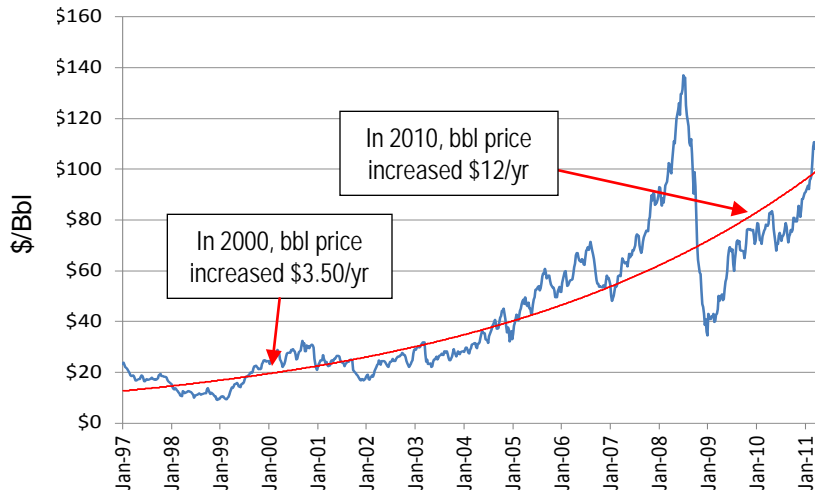
May 2011

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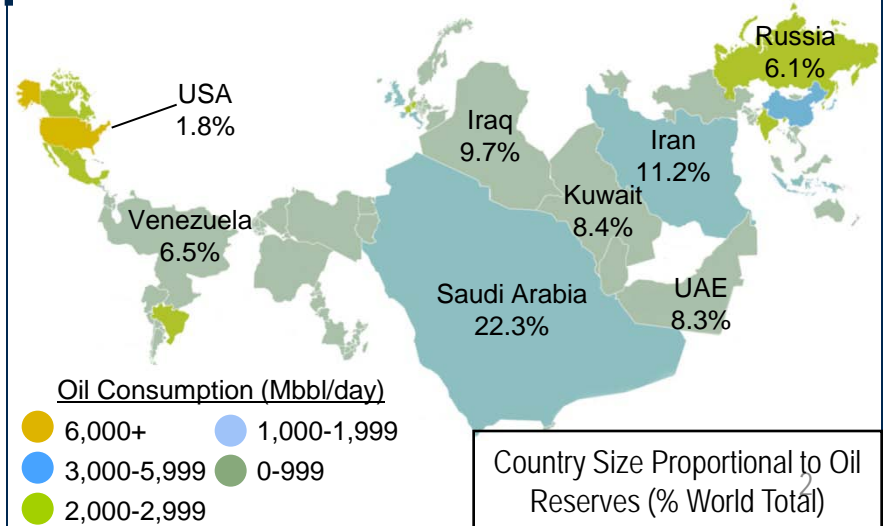


Resource Challenge: Petroleum

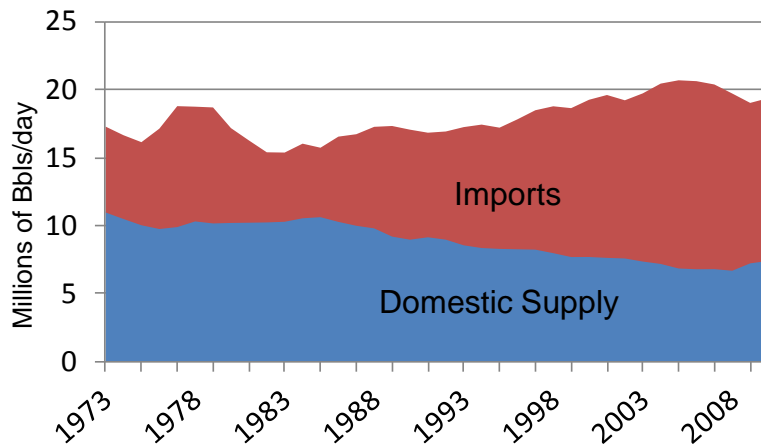
Price Volatility



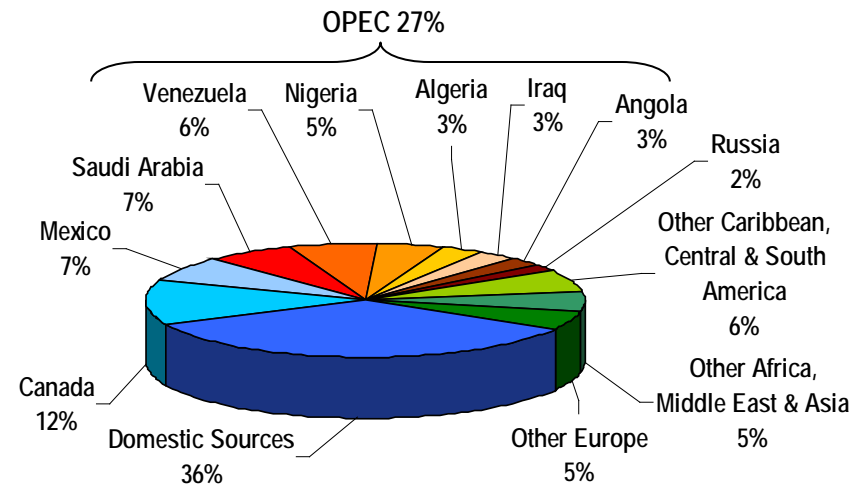
Distribution of Oil Reserves



US Crude Oil Supply Trend



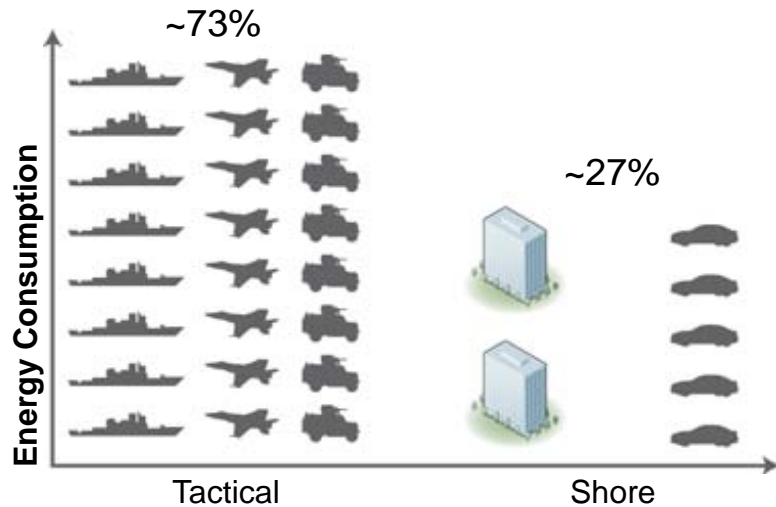
U.S. Petroleum Supply (Avg. of 2006-2009)



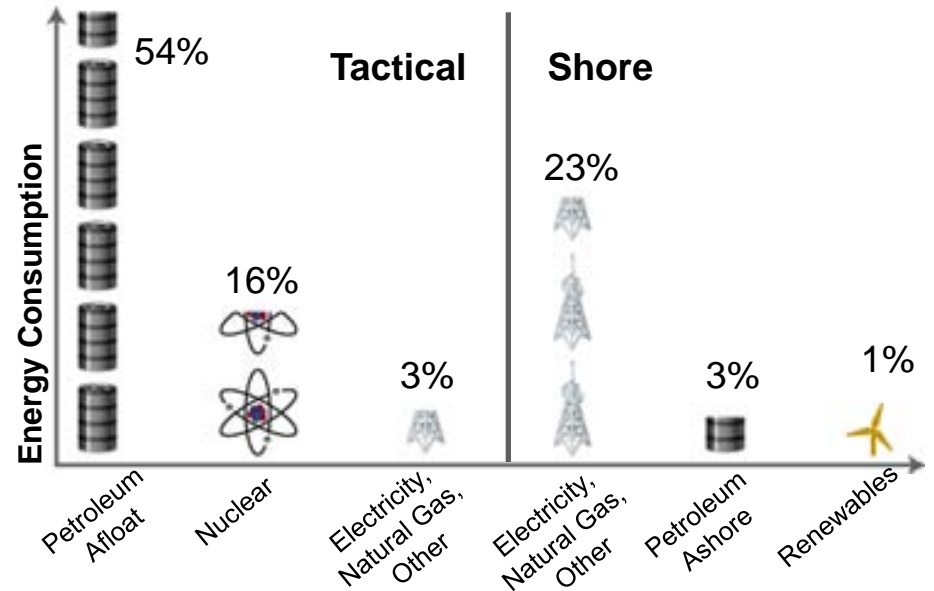


Navy Energy Profile

Overall Energy Consumption

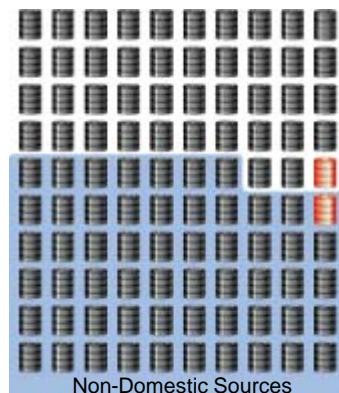


Overall Energy Sources



Navy Petroleum Consumption in Perspective

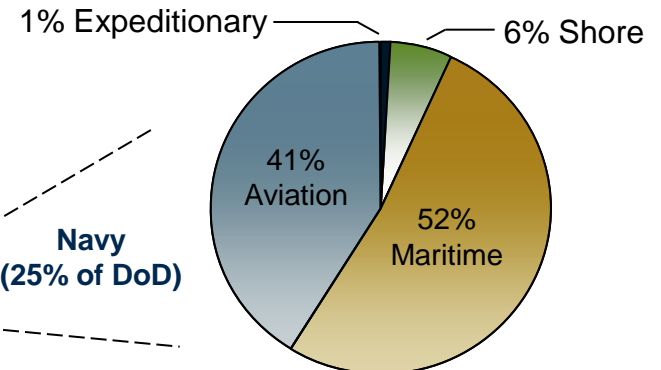
U.S. Petroleum Consumption



U.S. Gov't
(2% of U.S.)



Navy
(25% of DoD)



Total: 29 M bbls in FY08



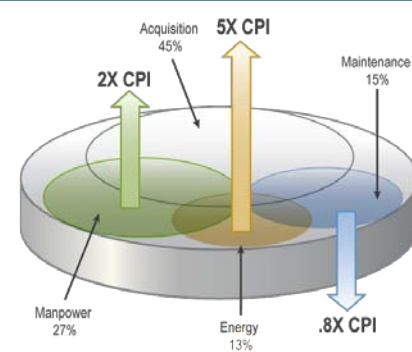
Navy Strategic Energy Objectives: Primary Focus

Improve Platform Performance



Reduce Costs

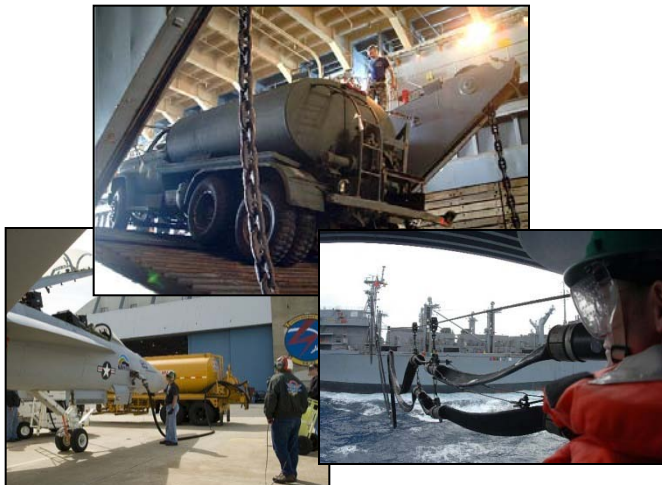
Surface Combatant Total Ownership Cost (1991-2009)



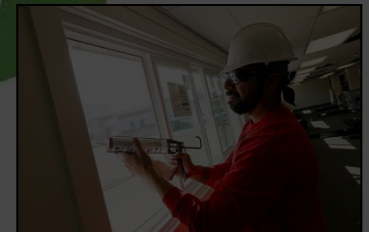
Since 1991

- CPI increased 59%
- Manpower costs increased 114%
- Energy costs increased 292%

Ensure Energy Security



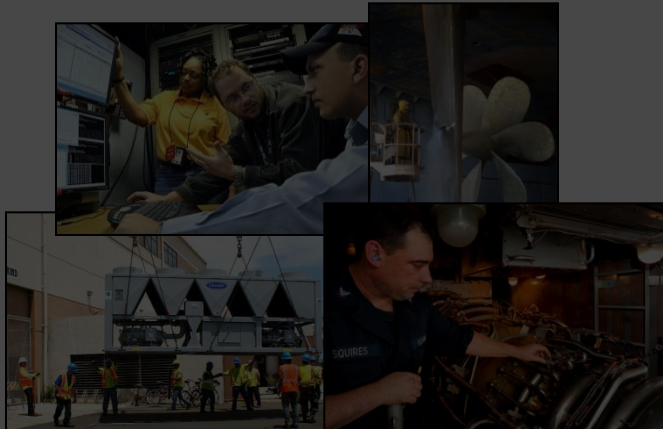
Green the Footprint





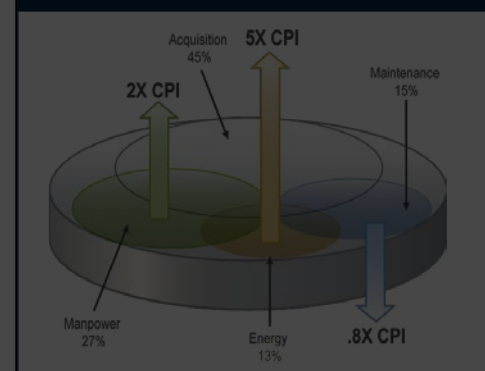
Navy Strategic Energy Objectives: Collateral Benefit

Improve Platform Performance



Reduce Costs

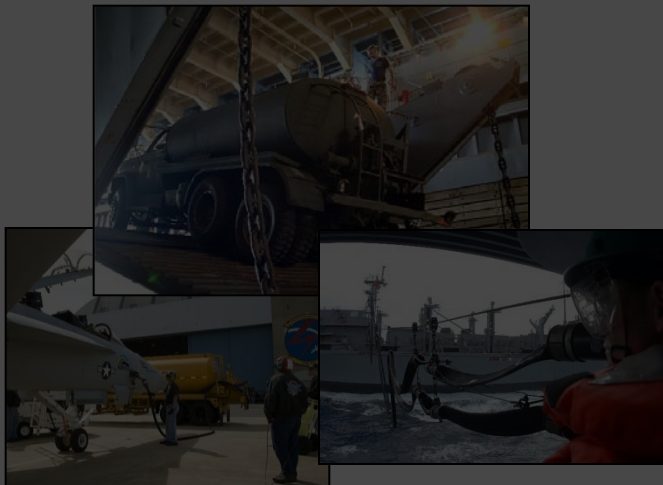
Surface Combatant Total Ownership Cost (1991-2009)



Since 1991

- CPI increased 59%
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Ensure Energy Security



Green the Footprint





SECNAV Energy Goals



50% Alternative Energy
by 2020



Sail the Great Green Fleet



2012 Green Strike Group Demo
2016 Great Green Fleet Sail



50% Net Zero Installations
by 2020



50% Less Petroleum in
Commercial Vehicles by 2015



Energy Efficient Acquisition



Shore Energy Approach

Energy Efficiency First



- Recapitalize our existing infrastructure with energy-efficient systems
- All new construction and major renovation projects must meet LEED Silver standards
 - Energy savings
 - Water efficiency
 - CO₂ emissions reduction
 - Resources stewardship
 - Environmental impact

Navy Culture and Behavior



- Link energy consumption to behavior
- Increased awareness and accountability at individual, command & functional levels
- Energy Audits – base and building level assessments
- Energy Managers
- Advanced Metering Infrastructure and other enabling systems

Integrate Technology



- Watch maturing technology and invest when/where viable (Solar, Wind)
- Partner to develop needed technology with other government organizations or industry (SmartGrid)
- Lead the development of mission critical technologies (Ocean energy for island base)



Maritime & Aviation Efficiency Initiatives



Efficient Ship Systems
Example: Solid State Lighting



Improved Hydrodynamics
Example: Stern Flaps and Hull Coatings



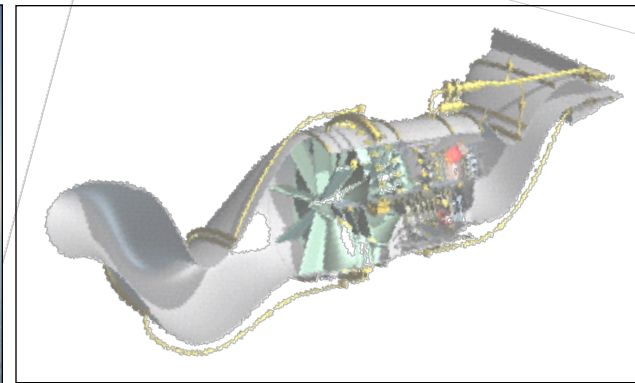
DDG-51 Hybrid Electric Drive
Test Platform: USS TRUXTUN



Operations & Policy
Example: Air Energy Conservation Program



Research & Development
Example: Engine Modifications



Science & Technology
Example: Variable Cycle Engine

Enhance capability by enabling fuel savings and expanding tactical reach

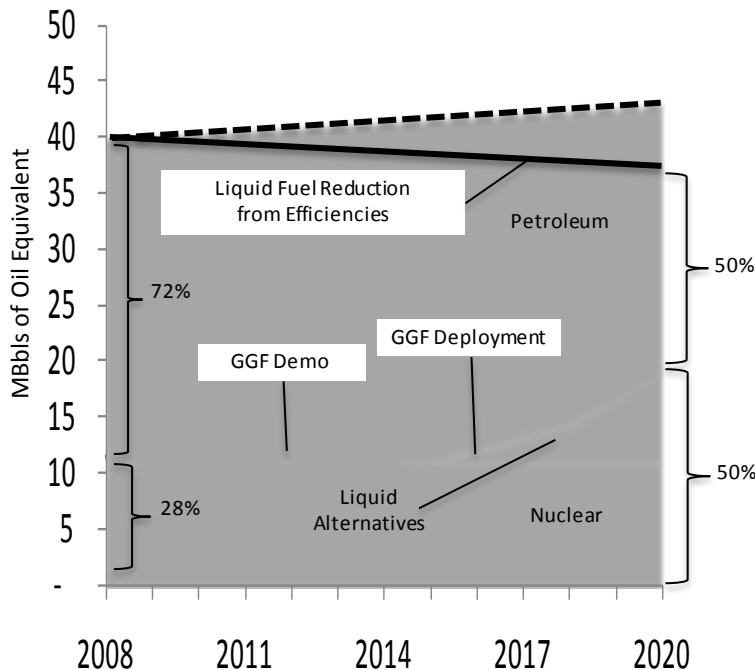


Alternative Fuels for Tactical Platforms

Why Next Generation?

- 1st-Gen biofuels unacceptable for tactical systems
 - Fuel degrades rapidly in storage
 - Lower energy density
- Focused on hydrotreated renewable jet fuel and diesel (HRJ and HRD)

Achieving 50% Alternatives Afloat

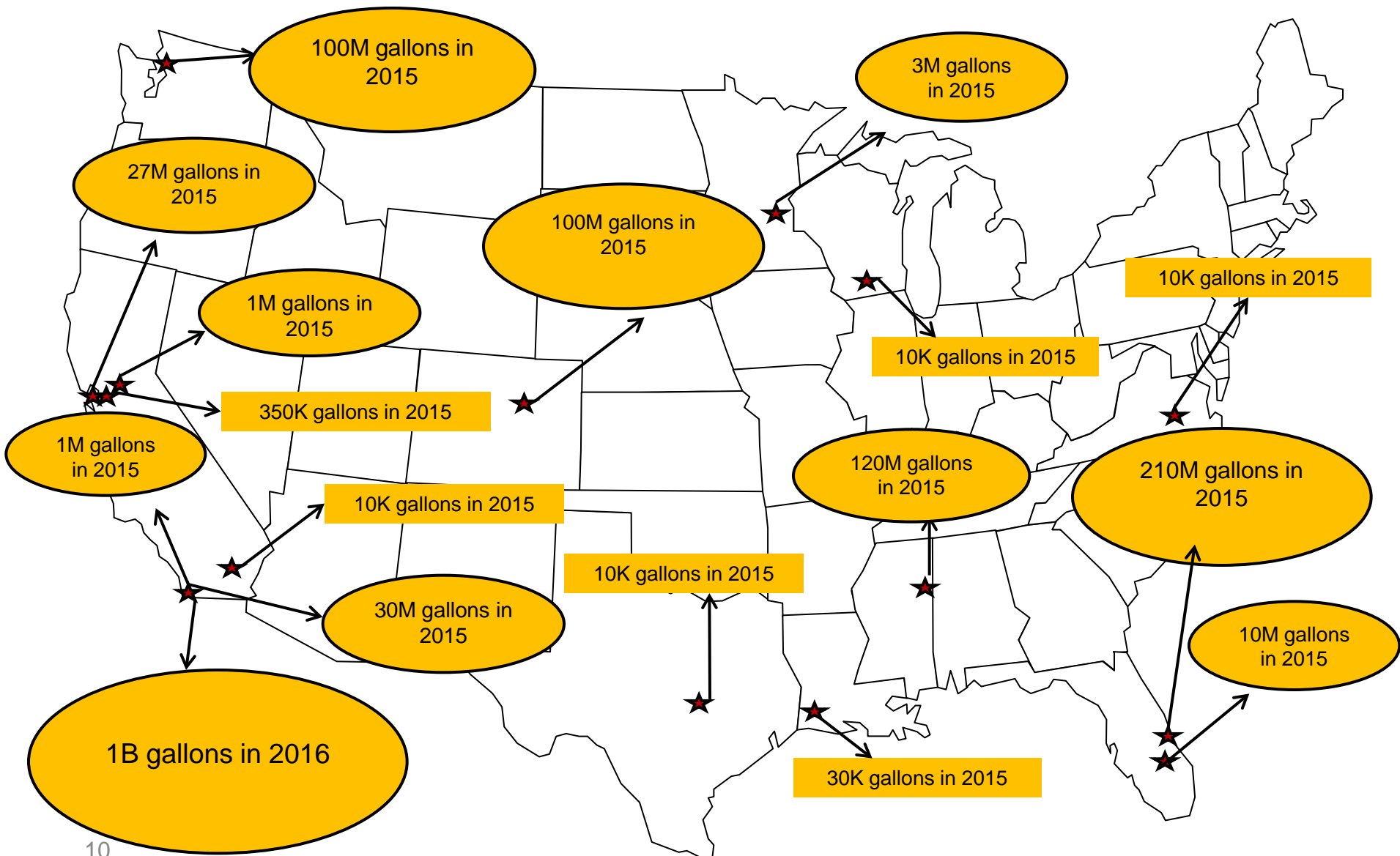


Alternative Fuel Requirements

- Drop-in compatibility with existing platforms, equipment, and infrastructure
- Quantity availability
 - 2012 Demo – 8K Bbls
 - 2016 Sail – 80K Bbls
 - 2020 50% Alternatives – 8M Bbls
- Price competitive with fossil fuel
- GHG compliant
 - EISA 2007 Sec. 526
- Sustainable
 - Minimize effect of feedstock inputs such as land, water, and fertilizer



Biofuel Companies of Interest





Test and Certification Milestones

COMPLETE



F/A-18 Super Hornet
April 2010



RCB-X
October 2010



MH-60S Seahawk
November 2010



Allison 501k G/T Generator
January 2011

UPCOMING



V-22 Osprey
Late Summer 2011



AV-8B Harrier II
Late Summer 2011



EA-6B Prowler
Late Summer 2011



Self Defense Test Ship (SDTS)
Early 2012

Engineering the fuel not the platform



Green Fleet Initiative

Fleet Composition



2012 Green Strike Group

- All ships and aircraft in demo group certified to run on 50/50 biofuel blend
- One destroyer will contain full load out of 50/50 biofuel or fuel will be split among CG/DDG
- Carrier will contain one tank of 50/50 aircraft biofuel
- CSG will feature fuel saving technologies, e.g. GT improvements, solid state lighting
- CSG will conduct exercise in local operations

2016 Great Green Fleet (GGF)

- Each ship will contain full load out of 50/50 biofuel
- Carrier will contain full load out of 50/50 aircraft biofuel
- GGF will include at least one Destroyer featuring Hybrid Electric Drive
- CSG will feature additional fuel saving technologies
- CSG will go on deployment



An Energy Smart Navy

Energy Efficient Acquisition

Existing Fleet Efficiencies

Diverse Energy Resources

Culture & Behavior Changes

Energy Smart
Navy

Energy Smart
Nation



Being "energy smart" – requires a Spartan mindset to ensure mission accomplishment...
in perpetuity.



Recent Energy Successes



China Lake Geothermal Power Plant, 270 MW



Shipboard Incentivized Energy Conservation Program (i-ENCON)



Guantanamo Bay Wind Farm



Aviation Training Simulators



San Diego Solar PV

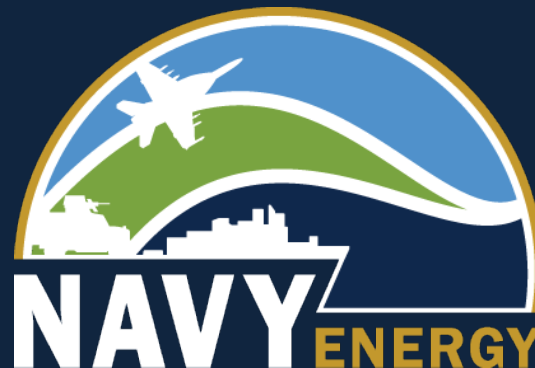


Questions?

For More Information:

Check out our Energy, Environment and Climate Change website at
www.greenfleet.dodlive.mil

You can 'Like' Task Force Energy on facebook at
www.facebook.com/navalenergy





Backup

“Two types of choices seem to me to have been crucial in tipping their outcomes towards success or failure: long-term planning, and willingness to reconsider core values.”

– Jared Diamond, Collapse: How Societies Choose to Fail or Succeed





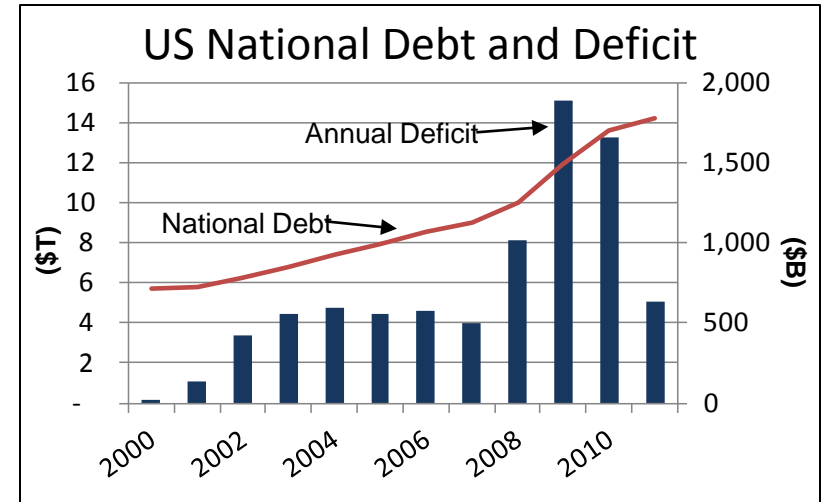
Challenges

Navy

- Energy Efficient Acquisition
- Bounding C5I Energy
- Culture Change – A Spartan Ethos

National

- Fiscal Pressures & Balance of Payments
- Energy Storage
- Cost Effective Alternative Scale-up





New Initiatives Afloat and Ashore

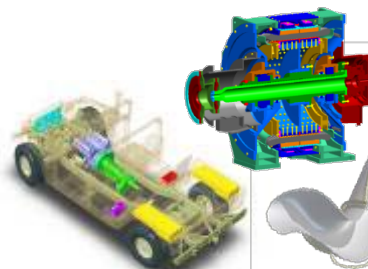
Alternatives

Assure Mobility



Efficiency

Expand Tactical Reach & Lighten the Load



Energy Security

Protect Critical Infrastructure



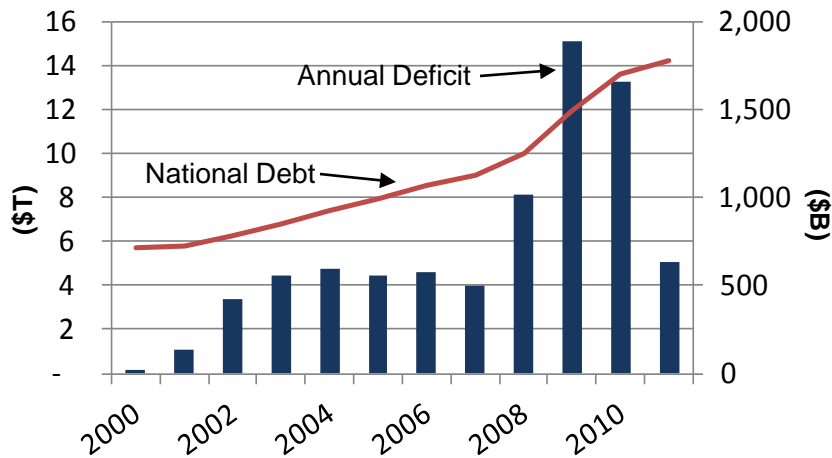
Energy Conservation





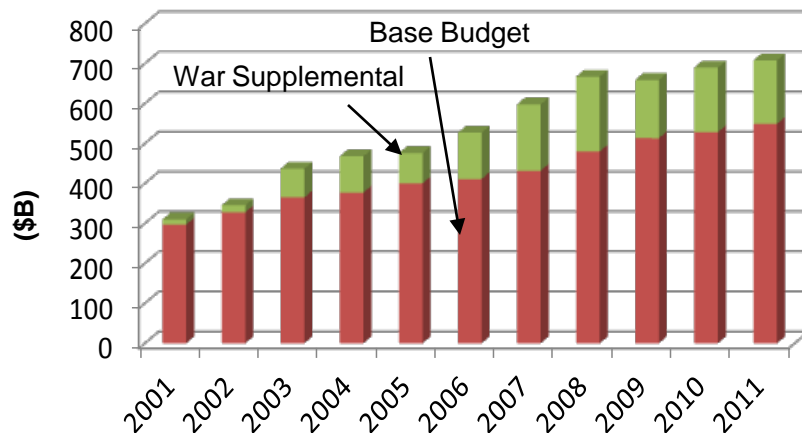
National Fiscal Realities

National Debt with Annual Deficit

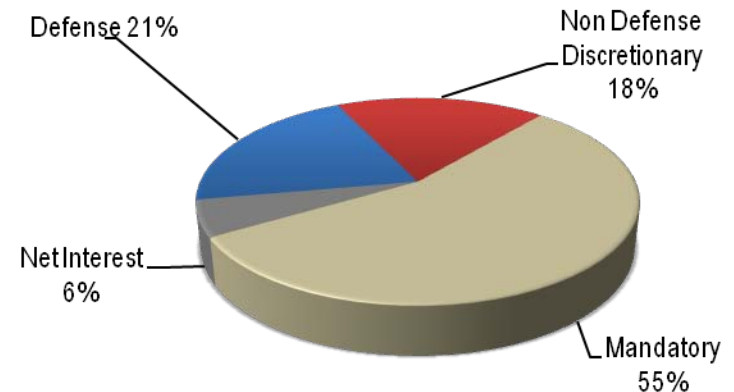


- Excessive deficit will impact all sectors of government to reduce national debt, military will not be exempt
 - Fiscal pressures for reduced spending playing out during current budgetary standoff
 - Reduced tax revenue from long-term recession exacerbates deficit with increased spending to aid economic recovery
- Defense Department targeted as increased spending for 2 wars more than doubled overall defense spending in 10 years
- Coupled with budgetary pressures are consistent increases in energy prices for Navy due to heavy reliance on fossil fuel

Defense Budget



FY12 National Budget Components





CNO Energy Goals



50% Reduction in Shore
Energy Use by 2020

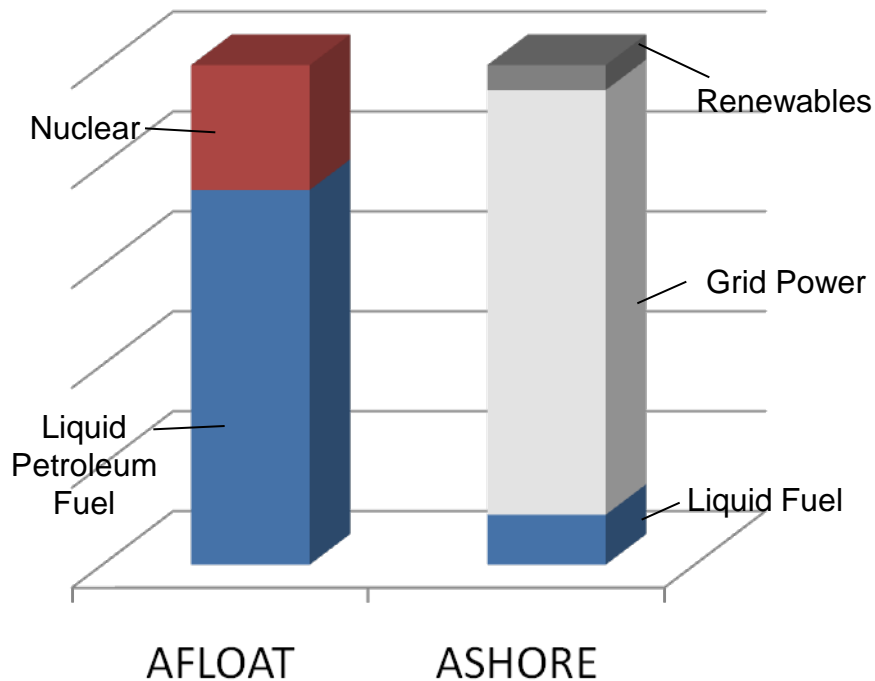


15% Reduction in Tactical
Energy Use by 2020

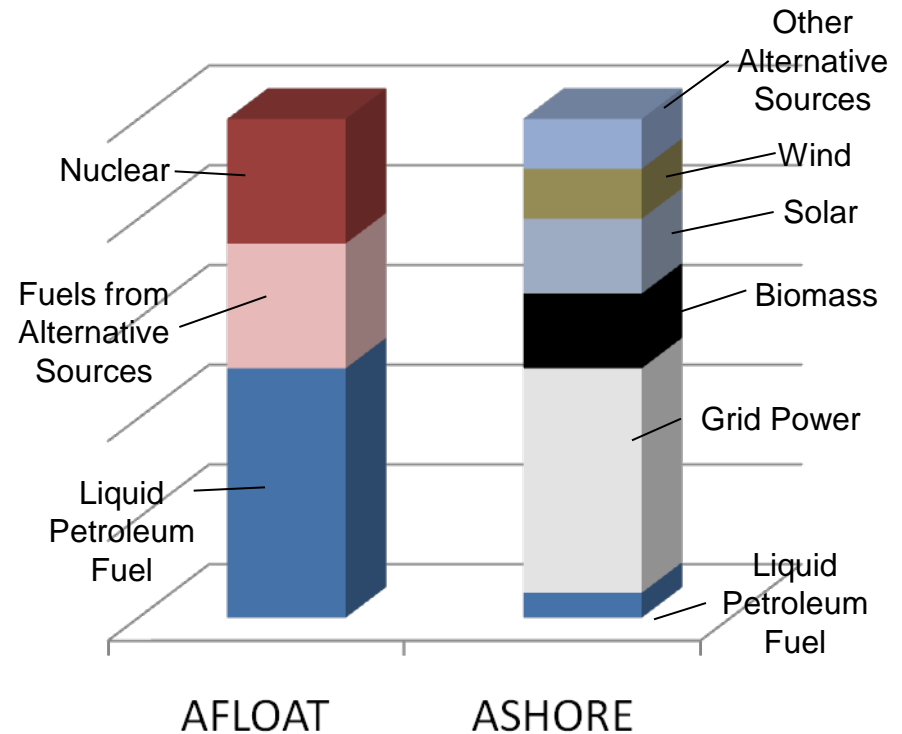


Alternatives – Diversifying the Fuel Mix

TODAY



TOMORROW



Greater diversity of energy sources in the future reduces risk of over-reliance on single sources of energy



EO 13514 Energy Related GHG Emission Reductions

Tactical vehicles and ships are exempt from EO 13514 emission reduction targets

Facilities & Non-Tactical Vehicles
27%

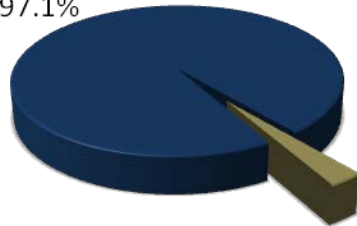
Navy Energy Use

Tactical
73%



FY 2010 Navy Total GHG Emissions

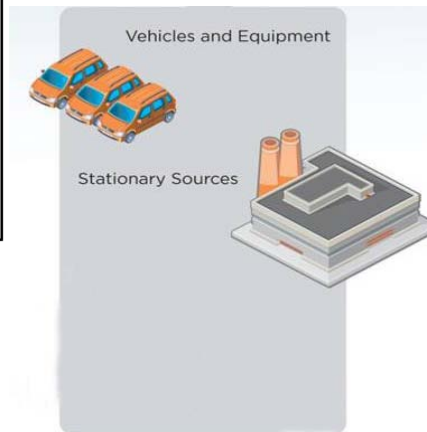
Energy
97.1%



Other
2.9%

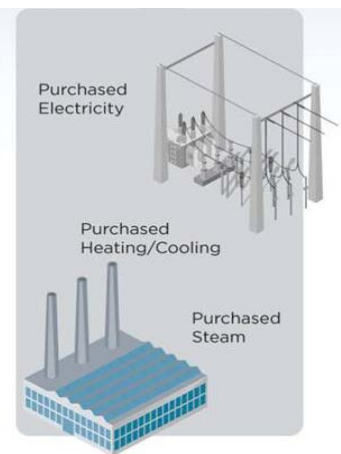
34% Reduction by 2020

13.5% Reduction by 2020



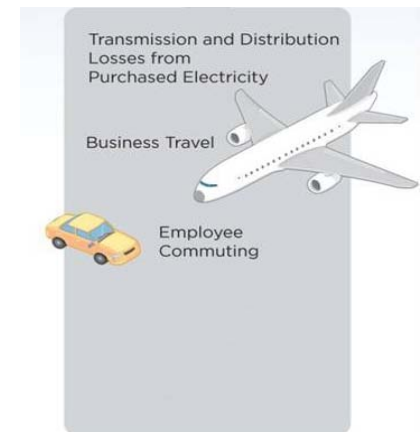
SCOPE 1:

Greenhouse gas emissions from sources that are owned or controlled by a Federal agency.



SCOPE 2:

Greenhouse gas emissions resulting from the generation of electricity, heat, or steam purchased by a Federal agency.



SCOPE 3:

Greenhouse gas emissions from sources not owned or directly controlled by a Federal agency but related to agency activities.



Culture Change – Return to Our Roots

Training and Education

- Mandate accession training for officers and enlisted that includes energy awareness as a core element



Personnel Incentives

- Create Energy Subspecialty Codes for officers and enlisted



Unit Incentives

- Energy efficiency, conservation, and leadership recognized at unit level afloat and ashore



Energy Efficient Acquisition

- Incorporate energy in the Analysis of Alternatives



...A Spartan Warrior Ethos





Culture Change – Sample Initiatives

AFLOAT

- Development of Bridge Dashboard through ICAS
 - Provides actionable info for optimum system eff.
 - Focus on HVAC and gas turbine generators
 - Validate shore consumption in-port
- Portable Fuel Recovery / comp water treatment
 - Cost avoidance / eliminates waste stream
 - Payback after one use
 - Navy-wide application
- Expansion of Shipboard Energy Audits
- Efficiency Retrofits for Legacy Fleet

- Enabled by ICAS (Integrated Condition Assessment System)
- Software & hardware
- Identifies equipment in need of maintenance or replacement
- Permits review of hull, mechanical & electrical data



ASHORE

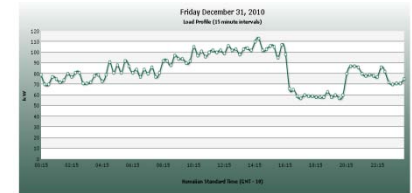
- Real Time Building Metering
 - Provides actionable data for BEMs
 - Alternate solution until AMI is fully operational
- Building Energy Managers (BEM)
 - Energy audit included in Zone Inspection checklist
 - Participate in monthly Regional meetings
- Utilities Efficiencies
 - Increase efficiency to central Low Air Pressure syst.
 - Business Case Audits to identify efficiency opps.

Status:

- Pilot completed at Pearl Harbor
- 15% energy savings potential identified

Way Ahead:

- Install remotely programmed t'stats
- Train BEMs to use data
- Implement metering on additional buildings

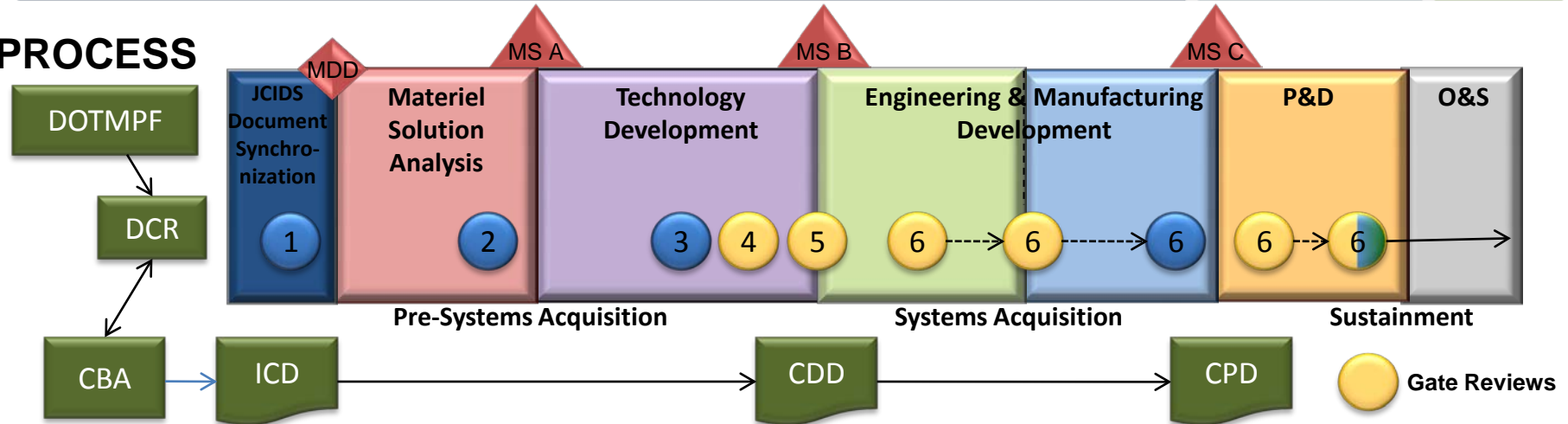


Fleet demonstrates a sea-shore integrated approach

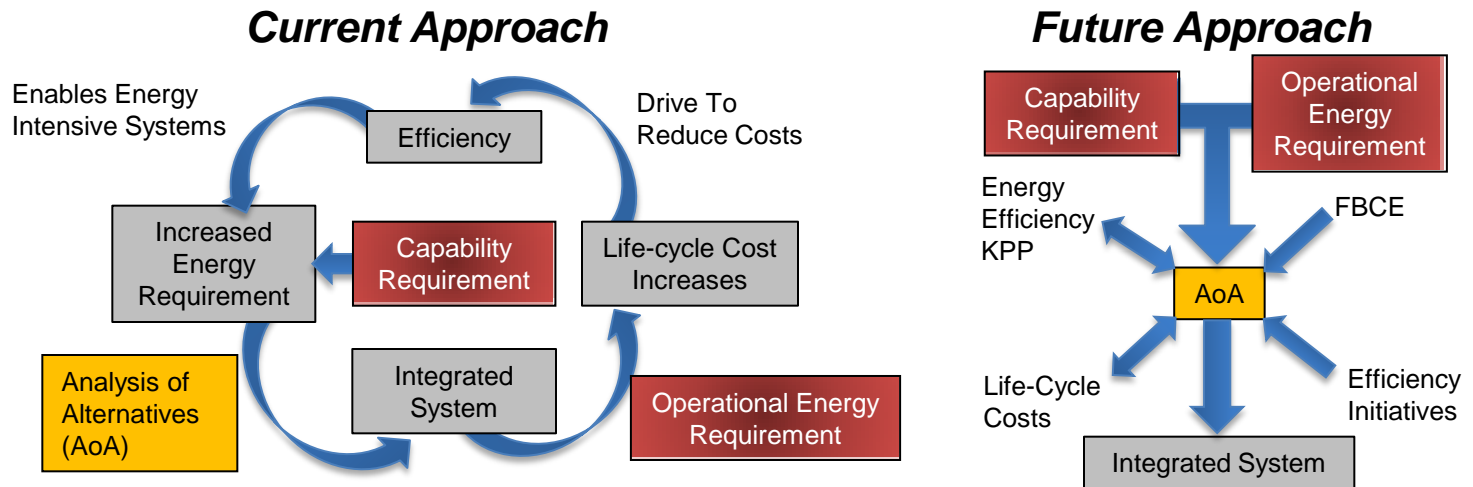


Energy Efficient Acquisition

PROCESS



PARADIGM



Considering Energy earlier and centering around AoA tradeoffs